





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Device for energy generation from electric field of atmosphere

Abstract

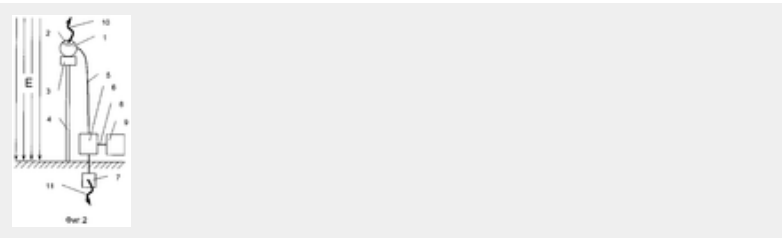
FIELD: electrical engineering.

SUBSTANCE: proposed device designed for generating electrical energy of desired amount from electric field of atmosphere and for no-break power supply to off-line electrical equipment, such as computerized weather stations and space probes, has electrodes, bearing structure, and atmospheric gas ionizers. Electrodes are spaced along electric field lines of force. Electrodes surrounded by atmosphere are disposed on bearing structure. Outer surface of these electrodes is aligned with atmospheric gas analyzers. Bottom electrode functions as grounding conductor. Load is connected between electrodes spaced along lines of force of atmospheric electric field. In absence of contact between device and the Earth external surface of all electrodes surrounded by atmosphere is physically aligned with atmospheric gas analyzers. Energized current-carrying parts of device are electrically isolated from bearing surface.

EFFECT: reduced mass of device dispensing with moving parts, simplified design and easy shipment of its components.

1 cl, 2 dwg

Images (1)



Claims (1)

translated from Russian

1.
- An apparatus for recovering energy from the atmospheric electric field, comprising electrodes spaced along the field lines, the bottom of which is the earth electrode, the supporting structure with encircled atmosphere electrodes ionizers atmospheric gas, structurally combined with the outer surface of these electrodes, characterized in that between spaced along field line electrodes included a load in the absence of the device in contact with the outer surface of the planet atmosphere surrounded electrodes constructive about aligned with the ionization of atmospheric gas, the conductive portion of the device under voltage, electrically insulated from the supporting structure.

Description


translated from Russian


The invention relates to electrical engineering and is intended to ensure uninterrupted autonomous electrical energy, such as automatic weather station or space probes on the Earth and other planets with the atmospheric electric field.

Aware of the difficulties associated with the uninterrupted supply of energy autonomous electrical equipment. Internal power sources (batteries, accumulators, fuel cells) require periodic replacement, recharging or refueling, i.e. qualified service manual.

RU2245606C2

RU Grant

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Other languages: [Russian](#)

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Info: [Non-patent citations \(2\)](#), [Similar documents](#), [Priority and Related Applications](#)

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External sources of energy (flowing water, wind, sunlight) require the use of massive large-sized structures, transmitters with moving parts and are not always available.

To solve the problem let low-power needs, but reliable anytime, anywhere uninterrupted power source. Subject to the conditions of autonomous electrical operation it should be easy, structurally simple and easy to transport to any distance.

Known devices for indirect energy from the atmosphere by water wheels, hydroelectric turbines and other installations, and also to direct energy from the atmosphere by means of wind turbines, wind turbines and other installations. In these devices, atmospheric energy is converted into heat, work or electricity.

Uninterrupted flow generated with their help it is impossible to provide energy. It depends on the state of the atmosphere, climate and time of year. (. Chaly G. Energy yesterday, today and tomorrow - Chisinau: Map Moldovennske, 1977. - 202, IL, pp 44-64,...).

For the prototype adopted diverter, which is designed to neutralize the atmospheric electric field energy. A lightning arrester comprising a vertically oriented supporting structure rising above the terrain, and spaced along the lines of the field electrodes, the collector interconnected. At the top structure is surrounded by an electrode mounted atmosphere - lightning arrester in the form of a massive metal rod. It can be combined with the atmospheric gas ionizer. The lower electrode is an earth electrode and provides an electrical device contact with a surface of the planet (V.V.Bazutkin and other high voltage equipment -. M.: Energoatomizdat, Textbook for high schools, 1986. - 464 p, yI, pp 219-220...). The design of a lightning conductor does not include a payload. lightning energy is used almost entirely outside for heating the soil surrounding the earthing switch, heating and ionization of the air.

Signs prototype match the essential features of the invention are as follows. A lightning arrester comprising electrodes, a supporting structure and the atmospheric gas ionizers. Electrodes spaced along the electric field lines. Surrounded atmosphere electrodes are arranged on the supporting structure. The outer surface of these electrodes structurally combined with the atmospheric gas ionizers. The lower electrode is an earth electrode.

The reasons impeding obtaining a desired technical result, the prototype, are as follows. Lightning conductor provides air flow through the electric current only in the form of intermittent spark discharge. the passage of this current time is unpredictable, and the value is random and can not be adjusted. Lightning conductor contains no payload. It is designed to work in an abnormally strong electric field, and most of the time useless idle. Lightning conductor does not work in places where there are no storm clouds. A lightning arrester does not work in the absence of contact with the planet. Lightning conductor parts have electrical isolation from the supporting structure.

The technical result - uninterrupted energy from the electric field of the atmosphere in the required amount and for this purpose create the proposed device.

Apparatus favorably with ease, lack of moving parts, ease of required components and their ease of transportation. It is more reliable than all hitherto known independent power supply devices, including wind turbines and solar panels, since the electric field of the atmosphere is weakly dependent on the time of year, there is round the clock and is available anywhere in the world.

The technical result is achieved as follows. Between the electrodes spaced along the lines of the atmospheric electric field is turned on load. In the absence of the device in contact with the outer surface of the planet surrounded electrodes atmosphere structurally combined with the atmospheric gas ionizers. The conductive portion of the device under voltage, electrically insulated from the supporting structure.

The essential features of the claimed invention as follows. An apparatus for recovering energy from the atmospheric electric field comprises electrodes spaced along the electric field lines, the lower electrode is an earth electrode. The electrodes are surrounded by the atmosphere, it is placed on the supporting structure. Ionizers atmospheric gas structurally aligned with the outer surface surrounded by electrodes atmosphere.

Unlike the prototype between spaced along the electric field lines included electrodes load. In the absence of the device in contact with the outer surface of the planet electrodes structurally combined with the atmospheric gas ionizers. Energized live parts of the device are electrically isolated from the supporting structure.

The farther apart the electrodes are spaced, the higher the electric field strength near the surface and more spreading velocity of free charge carriers in the surrounding gas. Surrounded by an atmosphere favorable to place electrodes in the most remote

points of the vertical supporting structure. Spreading of charge carriers in the atmosphere promotes free movement of gas at the electrodes and around the device no other stress raisers.

In the presence of the device in contact with the planet earth electrode is a lower electrode. This provides a low electric resistance to the passage of atmospheric electric current through the soil. In the absence of the device in contact with the planet atmospheric electrical current generated by them can pass only through the gas discharge channel. In this case, all the electrodes are surrounded by an atmosphere (both upper and lower) structurally combined with the atmospheric gas ionizers. Thus, a smooth transformation of the atmospheric electric field energy into the energy of electric current flowing through the load. Further useful conversion of this energy into heat, work or electricity by selecting the type of load (heater, motor or other electrical equipment).

Influence of essential features of the claimed technical effect obtained in the following. The supporting structure provides a proper orientation device in the atmospheric electric field coincides with the direction of its lines of force. It keeps spaced along the field lines of the electrodes at the required distance for operation, the device provides mechanical strength and its separate parts united into a whole. Electrodes should move apart from each other by a technically maximum possible distance. Proportional to the distance increases, the electric field at their outer surface, which increases mobility of charge carriers in the atmosphere surrounding the electrodes and facilitates the flow of electrical current therethrough. Mutually remote position of the electrodes eliminates obstacles to free movement of the atmospheric gas streams.

In the presence of the device in contact with the planet earth electrode is a lower electrode. It is the most simple, cheap and reliable way to ensure low resistance to flow through it into the ground electric current. Surrounded atmosphere electrodes are mounted on the supporting structure. This ensures the stability of their spatial position in an external electric field. Ionizers atmospheric gas structurally aligned with the outer surface surrounded by electrodes atmosphere. This ensures the constant presence of a sufficient number of free charge carriers in the space adjacent to the electrodes and the free movement of these charges along the electric field lines. Thus, electrical contact is provided with a low resistance between the solid electrodes and the atmospheric gas. The force transmitted through such contact current over a wide range does not depend on the external electric field and the capacity is determined only by the ionizers. This ensures continuity of energy, regardless of external factors, minimizes power consumption for maintaining the non-self-electric discharge channel through the neutral atmosphere and prevents current surges through the device in a thunderstorm activity.

In the absence of the device in contact with the planet atmospheric gas ionizers structurally aligned with the outer surface of the electrode surrounded by the atmosphere, both upper and lower. This is the only method available to ensure the flow of electric current through the atmosphere on either side of the deployed device along the lines of the field.

The load is connected between the spaced apart along the field lines of the electric field electrodes. This provides serial connection it (together with the electrodes) in a circuit current passing through the electric discharge atmosphere nonself. The product of the voltage drop across the load and the amount of current passing through it determines the useful power received from a device outside the electric field. useful devices coefficient determined by the balance between the load resistance and the transfer resistance of the electrodes with the surrounding space (ionizers capacity). The lower the contact resistance of the electrodes, the greater part of the energy released in the load.

Insulation of live parts of the device from the bearing structure ensures optimal arrangement of the electric field lines in the surrounding area and to prevent the flow of electric current through the conductive parts of the device, unrelated to its circuitry.

Uninterrupted power supply provided by the fact that the electric field of the atmosphere is not dependent on the time of year, there is a clock in all weather, anywhere in the description of the troposphere. This energy resource atmosphere is constantly fueled by all the power of the planetary mechanism of separation of electrical charges.

The reliability of energy supply is provided by the simplicity of the device, in the absence of its most important elements of moving parts. Energy from the atmospheric electric field does not require large structures (dams, towers high altitude) and complex technological methods. Maintenance of such a device is much easier than in prior art.

Simplicity of design elements of the device for obtaining energy from the electric field of the atmosphere arises from the fact that it comprises only standard electrical components without moving parts, requiring no setting adjustment and regular maintenance. Details of apparatus and parts of the supporting structure does not require careful manufacture.

Easy to transport device is achieved in that it is made with a minimum margin of safety, since it is not experiencing dynamic loads and, therefore, for its production does not require massive, large parts and assemblies. Apparatus performed foldable or

collapsible.

1 is a perspective view of an apparatus for recovering energy from the electric field of the atmosphere in the absence of contact with the planet.

The apparatus comprises a vertically oriented support structure, such as balloon 1, electrodes 2, 3, the air ionizers 4 and 5, the insulators 6 and 7, the cables 8 and 9, the voltage converter 10 and the load, e.g. radiosonde balloon 11. The surrounding space tested Power outside the electric field lines E. The electrodes are structurally combined with air ionizers are fixed on insulators. The balloon holds the electrodes at a sufficient distance from each other and the cables connecting them to the voltage converter. voltage converter associated with a payload and electrically integrated common housing.

The apparatus operates as follows. After switching on the ionizer 4, 5 saturate the air surrounding the electrodes 2, 3, the free charge carriers. They begin to drift through the neutral air moving along the lines of force of the atmospheric electric field E, is further amplified spaced position electrodes on the balloon 1. Leakage of charge carriers from the electrodes is compensated for constant work ionizers. By nonself gas discharge channels 12 and 13 from the electrodes through the atmosphere there is a constant electric current. Between spaced electrodes a potential difference. They retain its through insulators 6 and 7. When the electrodes at the working potential difference (≈ 5 kV) voltage switched converter 10. Atmospheric electrical current therethrough closes through cables 8 and 9. The converter transforms the input current into high voltage DC output voltage feeding payload 11. The process continues until there is an atmospheric electric field and act ionizer electrodes.

Determine the electrical power necessary for independent uninterruptible power payload. For example, modern equipment for radiosonde balloon suspended to sufficiently constant electric power of 10 watts. Determine limiting the electrical power required for operation of accessories and air ionizers. For example, in an amount of not more than 150% of the usable, i.e. 15 watts. Considering the operating conditions of current collectors define limiting the potential difference between the exposed conductive parts of the installation. For example, it is recommended to 10 kV and 5 kV actually selected. Calculate the maximum current in the discharge channel. In this case, not more than $(10 \text{ W} + 15 \text{ W}) / 5 \text{ mA} = 5 \text{ kV}$. This value specifies ionizers performance, structurally combined with the electrodes. Determine the conduction current density, and the vertical field strength in the troposphere to the calculated flying height. For example, the conduction current is not more than $1.5 \text{ mA} / \text{m}^2$, the electric field intensity $2,2\text{--}3,5 \text{ V} / \text{m}$. Calculate the distance between the electrodes, their shape and structure to ensure effective spreading of charge carriers generated by the ionization of the atmosphere. For example, the distance 50 m, the shape of the receiving electrodes - the ball, the area of each of at least 0.5 m^2 . A balloon attached and suspension system with insulators electrodes, lay the cable, are mounted in the container with the equipment voltage power converter.

FIG. 2 is a perspective view of an apparatus for recovering energy from the electric field of the atmosphere in contact with the planet apparatus.

The apparatus comprises an electrode 1, ionizer 2, an insulator 3, a supporting structure (rack) 4, the cable 5, the voltage converter 6, the ground connection 7, the connection cable 8 and a payload (weather station) surrounding space 9. tested to the ground surface outside power line electric field E. The electrode is structurally combined with the air ionizer is fixed on the insulator. Stand holds the electrode at a sufficient height, and the cable connecting it to the voltage converter. The voltage converter is electrically connected with the ground through the grounding and the payload via a connection cable.

The apparatus operates as follows:

After switching on the ionizer 2 saturates the air surrounding the electrode 1, free charge carriers. They begin to drift through the neutral air moving along the lines of force of the atmospheric electric field E, is further amplified elevated position on the counter electrode 4. Leakage of charge carriers from the receiving electrode is compensated by regular job ionizer. Via nonself-gas discharge from the electrode 10 through the atmosphere there is a constant electric current. Electrode acquires the electric potential relative to the ground surface and stores it through the insulator 3. When the potential of the working electrode (≈ 25 kV) is switched voltage converter 6. Atmospheric electrical current therethrough is closed via the cable 5 on the ground 7. The converter transforms the input current at high voltage constant output voltage 27 V, supplied through the connection cable 8 to the power payload 9. The process continues until there is an atmospheric electric field and acts ionizer electrode.

Determine the electrical power necessary for independent uninterruptible power payload. For example, for modern automatic weather station fairly constant electric power of 100 W at rated voltage of 27 V. Determine limiting the electrical power required for operation of accessories and air ionizers. For example, in an amount not more than 50% of the useful, i.e. 50 watts. From the climatic conditions and characteristics of the susceptor structure is determined limiting the potential

difference between the exposed conductive parts of the installation. For example, it is recommended not more than 30 kV, and 25 kV actually selected. Calculate the maximum current in the discharge channel. In this case, not more than $(100 \text{ W} + 50 \text{ W}) / 6 = 25 \text{ kV mA}$. This value sets the performance of the ionizer, structurally combined with the electrode. Measured or found from tables of the electrical activity of the atmosphere (vertical conduction current density and field strength) in the locality.

For example, the conduction current is not more than $0.1 \text{ mA} / \text{m}^2$ the electric fields 110-250 V / m. Calculate the electrode lifting height above the terrain, its shape and surface working, sufficient for effective spreading of charge carriers generated in the ionizer the surface atmosphere. For example, the height of not less than 10 m, the shape - sphere, area of at least 1 m^2 . In the calculations take into account the wind speed, the presence of other stress raisers, the geological structure of the soil and other relevant factors. Install the required height rack with an electrode on the insulator, organize ground, mounted auxiliary electric power and voltage converter.

This ensures an uninterrupted supply of electrical energy due to autonomous gratuitous force of the atmospheric electric field. The apparatus advantageously distinguished by the absence of moving parts, ease of required components and their ease of transportation. It is more reliable than all hitherto known independent power supply devices, including wind turbines and solar panels, since the electric field of the atmosphere is weakly dependent on the time of year, there is round the clock and is available at any point of the globe.

Non-Patent Citations (2)

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Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
RU2003106714A	2003-03-11	2003-03-11	Device for energy generation from electric field of atmosphere

Applications Claiming Priority (1)

Application	Filing date	Title
RU2003106714A	2003-03-11	Device for energy generation from electric field of atmosphere

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